Do's and Don'ts of Grant Writing from an Insider's Perspective

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National Institutes of Health
*Environmental influences on Child Health Outcomes (ECHO)*

Specific items addressed

- Finding an appropriate Institute/Center/Office (ICO) for your application

- Finding the right person to speak to about your application

- What happens after the application is submitted?

- The review process, and the meaning of the scores

- How to (and not to) write your application; real life examples.

- What should you do, after receiving your summary statement, and how to revise and resubmit the application?

National Institutes of Health
Environmental influences on Child Health Outcomes (ECHO)
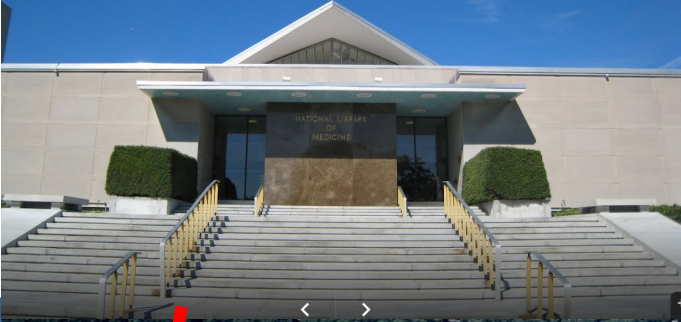
The NIH Main Campus, Bethesda, MD

National Library of Medicine
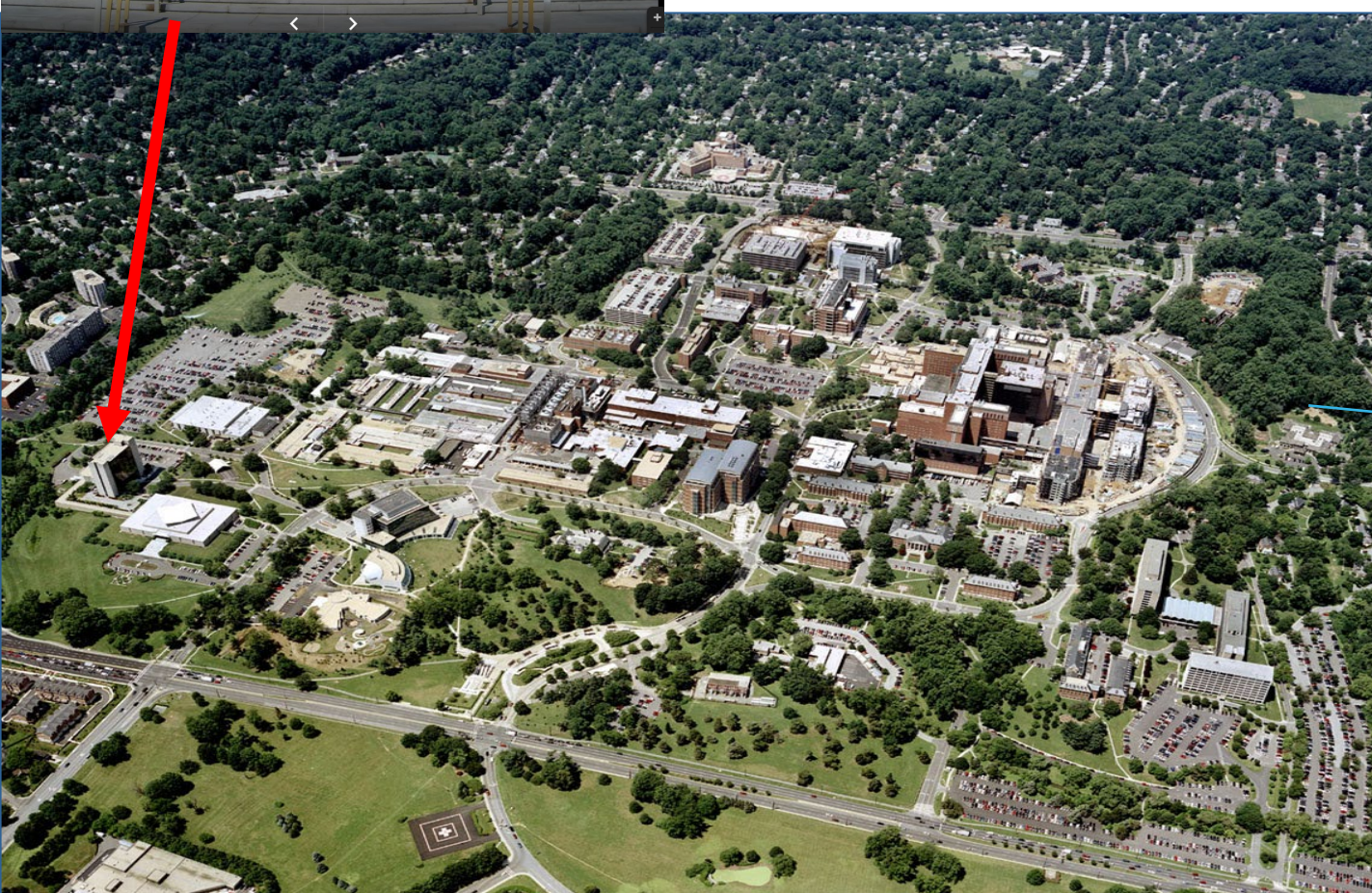
NLM History of Medicine Division
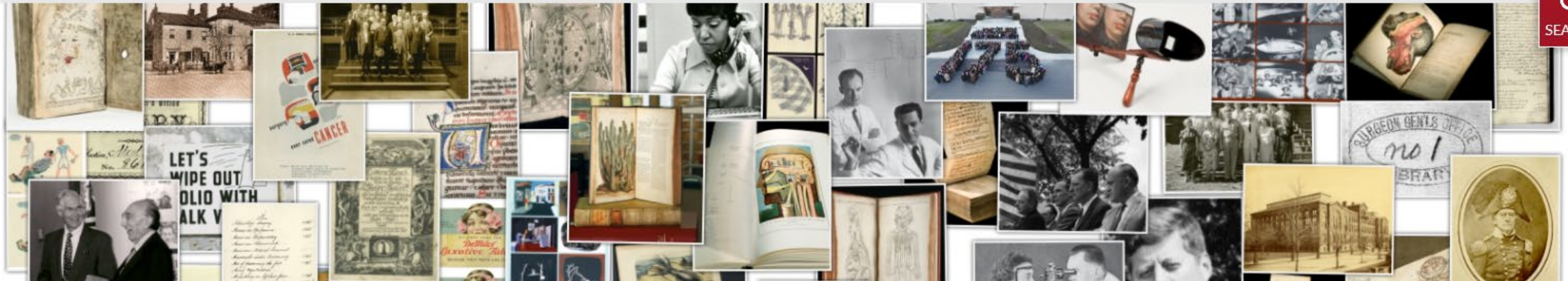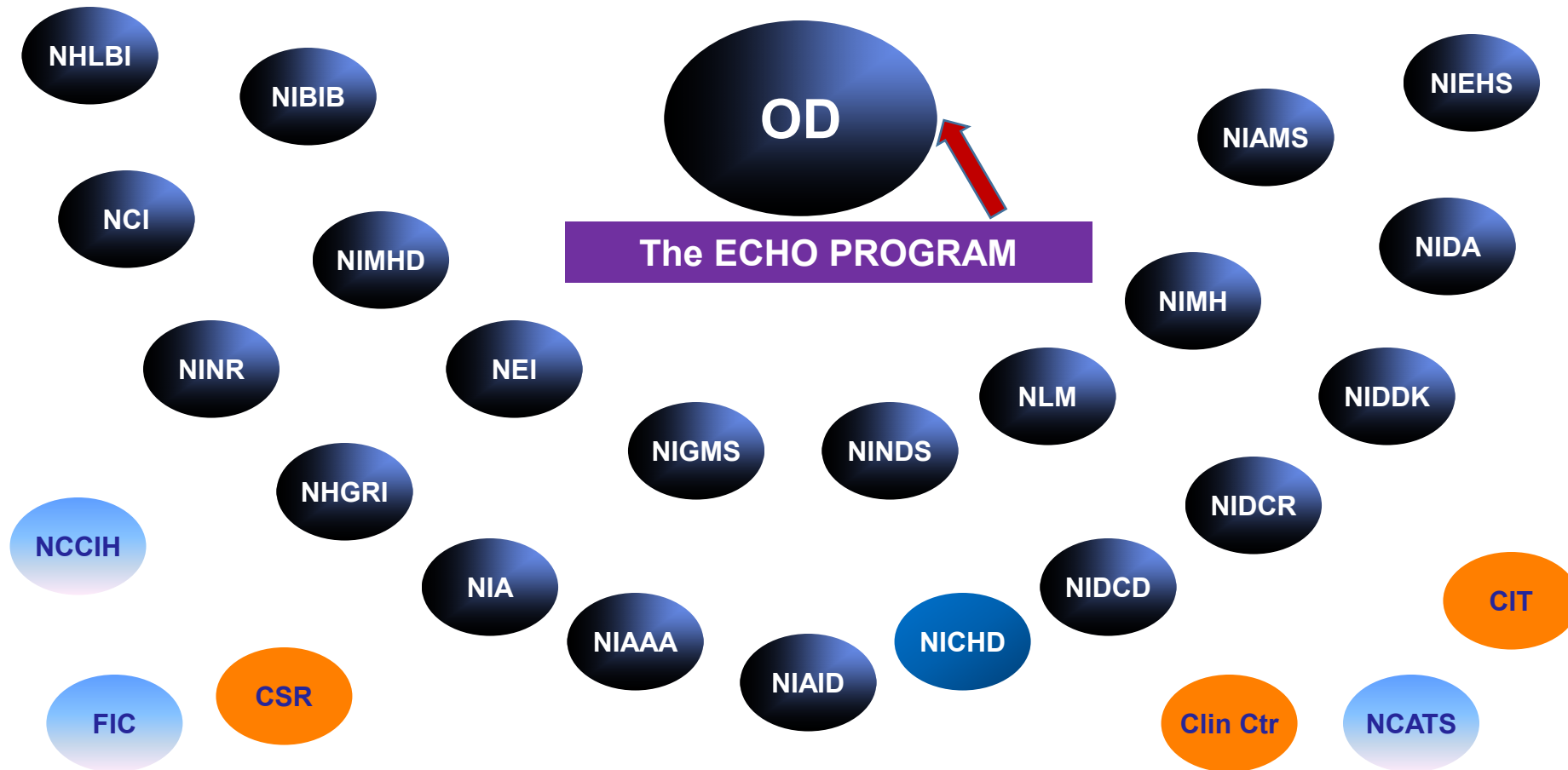

- **Has over 28 million items and related digital resources**
- **Spanning ten centuries (11ᵗʰ to the 21ˢᵗ), and from nearly every part of the world.**
- **Available for responsible use with (and some of them without) permission.**

27 Institutes and Centers in NIH

24 ICs offer Extramural Funding.

Grant applications must be relevant to the mission of the individual IC

Some NIH Offices Offering Extramural Funding

- **Environmental influences on Child Health Outcomes (ECHO)**
- Office of AIDS Research
- Office of Behavioral and Social Sciences Research
- Office of Dietary Supplements
- Office of Disease Prevention
- Office of Nutrition Research
- Office of Research Infrastructure Programs
- Office of Research on Women's Health
- Tribal Health Research Office

How do ICOs Plan on Spending $$?

- ~75-80% of their annual budget is spent on continued funding of grants and contracts
  - Example: years 2 through 5 of a 5-year grant or contract

- ~20% to be spent for the new research and training grants

- Training grant line gets between 5 to 8% of the annual budget

- NIH funding appropriations are annual
  - Unspent dollars at the end of the fiscal year by September 30 will return to the Department of Treasury.

- ICOs try their best to support research and contracts and spend their appropriation dollars fully before September 30th of the fiscal year

How do ICOs plan on spending $$s for research and training programs?

- All ICO have a specific mission statements—they spend dollars supporting research on the topics of their mission

- On topic areas the Congress asks the ICOs to focus on, in the annual budget appropriation (with or without set asides)

- Emerging "hot issues": ZIKA, COVID, opioid use disorders; high maternal mortality

- ICs organize annual (or bi-annual) "Operations Planning" meetings; the Program Staff requests for new projects

- Knowledge gaps identified at the NIH workshops or other in other major evidence reports

- Only ~16% of all pediatric research studies are funded by NICHD
  - Other ICs funding pediatric research: NHLBI, NINDS, NEI, NIDDK, NIAID, NIMH, NINR, NIBIB, NIDCD, NIDCR
  - The ICs that don't fund pediatric research:
   - National Library of Medicine, and National Institute on Aging

NIH Grant Nomenclature

- ** NIH uses three funding mechanisms:
  Research grants (includes career development); cooperative agreements; and contracts

- A 3-character code identifies a specific category of extramural research activity:
  (e.g., F32, K08, P01, R01, T32, U01, U24)

- A comprehensive list of activity codes is on the NIH Web site at
  http://grants.nih.gov/grants/funding/ac_search_results.htm.

**The Grant Number contains one of the following activity codes:

- Research Grants ("R" "P")

- Cooperative Agreements ("U") in which the NIH Project Scientist and Program Officers have substantial scientific and programmatic oversight.

- **ALL ECHO ISPCTN and ECHO Cohort grants are under U mechanism**

- Training ("F" "T")
  - F = Individual fellowship
  - T = Institutional training grants
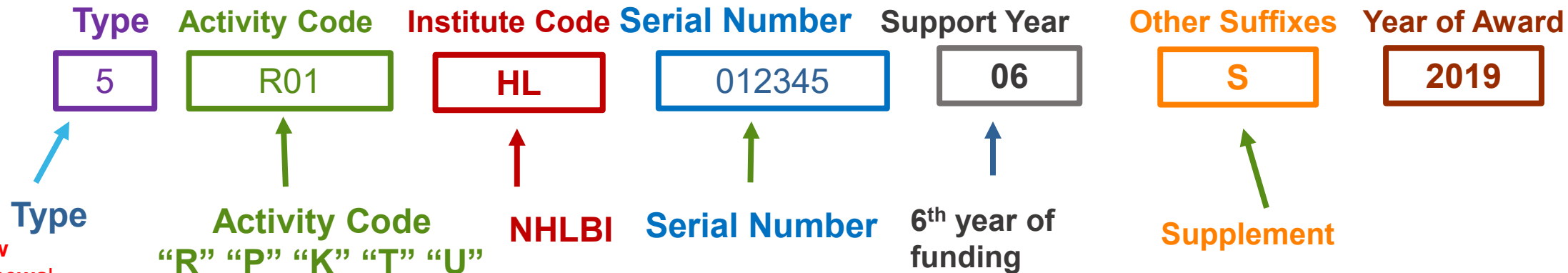
- Career development ("K")
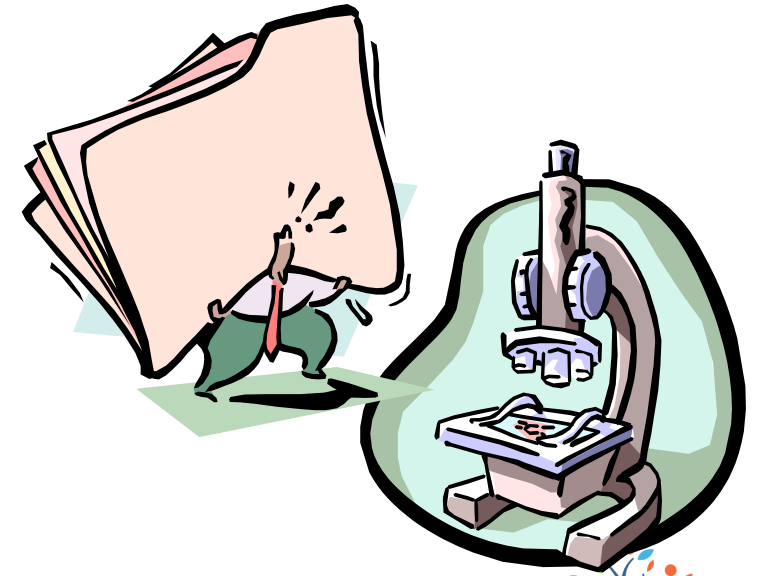
Some NIH Acronyms
https://grants.nih.gov/Grants/acronym_list.htm

- ICO: Institutes, Centers and Offices (or, just IC)
  - Topic-based Centers/Divisions and Branches

- FOA—Funding Opportunity Announcements
  - RFA—Request for Applications (with set aside dollars)
  - PA—Program Announcement (usually no set aside dollars, rarely set aside may be announced)
  - PARs—A PA with special **receipt, referral and/or review** considerations (usually no set aside, but consolidated review)
  - RFP—Request for proposals (soliciting contract proposals)
  - NOSI: Notice of Special Interest
  - NOT: Notice

- ND: Application not discussed in a Study Section

- PO: Program Officer (Project Officer)

- PS: Project Scientist

- NoA: Notice of Award

- GMS: Grants Management Specialist—whose name appears on the NoA

- GMO: Grants Management Officer—In a leadership position within the grants management office.

Anatomy of a Grant Number

Type — 5

Activity Code — R01

Institute Code — HL

Serial Number — 012345

Support Year — 06

Other Suffixes — S

Year of Award — 2019

Type
- **1 New**
- **2 Renewal**
- 3 revision for additional money
- 4 Extension
- **5 Non-competing continuation**
- 6 Change of organization (successor in interest)
- 7 Transfer to a new institution
- 8 Change of awarding institute or center for Type 5
- 9 Change of awarding institute or center for the renewal, Type 23

Activity Code
"R" "P" "K" "T" "U"

NHLBI

Serial Number

6th year of funding

Supplement

Assume your grant Number

5R01HL012345-06-S-2019

National Institutes of Health
Environmental influences on Child Health Outcomes (ECHO)

Finding an appropriate ICO for your application

- Based on the topic of your research matching the ICO mission
- For topics with more than one ICs' interest, speak to respective POs, and consider requesting dual (or multiple) assignment.
  - Pediatric diabetes/obesity (NICHD and NIDDK)
  - Cerebral Palsy (NINDS, NICHD)
  - Postpartum depression (NIMH, NICHD)
  - Respiratory distress syndrome (NHLBI, NICHD)
  - Racial Disparity and infant/maternal mortality (NIMHD, NINR, NICHD)
- Search for relevant branch/division within an ICO
- Google to find recent FOAs

Finding an Appropriate Person to speak to…

- Contact information on the ICO Home Page
- Search the Program Officers (PO) whose assigned portfolio matchers your topic
- Always contact ONE Program Officer; keep a written abstract
- If you did contact more than one, please let all of them know
  - Most POs know each other within & across ICs
- Discuss the outline of your research with the PO
- POs can provide some input about the science; they can recommend study sections, and advise on the budget

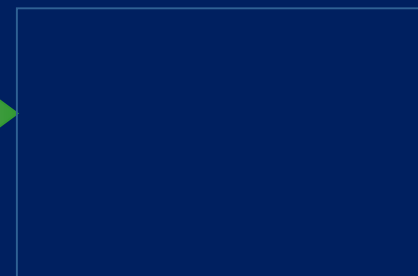# What happens after the application is submitted?

National Institutes of Health
Environmental influences on Child Health Outcomes (ECHO)

Anatomy of an NIH Grant
From submission to funding

Researcher

NIH Grant Proposal to CSR

At CSR

Initiates grant proposal:
• New project
• Continuing project

Scientific Review Panel

Scientists evaluate scientific merit of grant proposal

IC's Program Officer

Main contact for applicant Helps interpret review results

Funds

Congress

Institute Director

Makes final decision Allocates funds Provides annual justification to Congress

Institute National Advisory Councils
Appointed by the Secretary of the DHHS

Second Level Review and Approval of IC-Approved applications

"Scientific Review Panels" or "Study Sections"?

NIH Center for Scientific Review

About CSR   Applicant Resources   Reviewer Resources
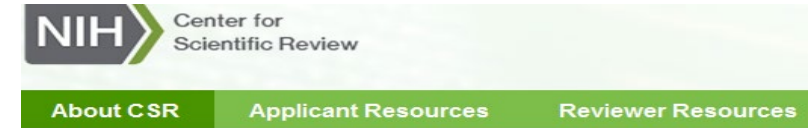
NIH Peer Review Process Revealed

NIH Peer Review Revealed

NIH PEER REVIEW REVEALED

$NO + CH_3O$
$OH + R$
$Cr + O_3$
$Si + 2H_2O$

0:00 / 14:52

- Center for Scientific Review is the gateway

- It convenes Extramural scientists to conduct the peer review of the applications.

- More than 20,000 scientists review ~90,000 applications each year

- About 70-80%% reviewed by CSR Study Sections

- Study sections are organized around topic themes

NIH National Institutes of Health
Environmental influences on Child Health Outcomes (ECHO)

Review Criteria*

- Significance
- Investigator
- Innovation
- Approach
- Environment

* Applicants must focus on the FOAs which might include additional review criteria, because the SRO also asks all reviewers are requested to study the FOA.

Review Criteria

- Significance
  - The most important criteria—clearly say what is the value of your research?

  - Ask yourself: *Who cares if I don't do this research?*

Two Categories of Scores

- Criteria score
  - Scores for individual review criteria given by the three assigned reviewers, and included in the summary statement

- The Impact or Priority Score (PS)
  - Reflects the overall strength of the application.

The Impact or the Priority Score

- The most important score

- Each member provides an impact score

- Scores range from 1 (best) to 9 (the other end)

- The average impact score in that panel X 10 is recorded in the summary statement; Score range:10 to 90

- Impact scores converted to percentile ranks are used to make funding decisions.

- The lower the % tile, the better are the chances of getting funded

- Impact score is **not** an average of the criteria scores

- Criteria scores reflect reviewers' opinions about individual scoring criteria—they help you while revising your application.

Overall Impact-Priority Score

Score	Descriptor	Comments	
1	Exceptional	Exceptionally strong with essentially no weaknesses	**Yes, funded**
2	Outstanding	Exceptionally strong with negligible weaknesses	
3	Excellent	Very strong with some minor weaknesses	**Possible with revision**
4	Very Good	Very strong with many minor weaknesses	
5	Good	Strong but with at least one moderate weakness	
6	Satisfactory	Some strengths, but with some moderate weaknesses	
7	Fair	Some strengths, but with at least one major weakness	**Unlikely**
8	Marginal	A few strengths and a few major weaknesses	
9	Poor	Very few strengths, and many major weaknesses	**Forget it**

Example of Criteria Scores

Criteria	Reviewer 1	Reviewer 2	Reviewer 3
Significance	5	2	7
* Investigator	2	1	3
Innovation	6	4	8
* Approach	3	3	3
* Environment	2	1	2

The final Impact score was 52--far worse than the "mean" criteria score of ~ 35!

- What did the criteria scores say?
  - All reviewers thought that <u>you</u> were good
  - So was your <u>institution</u>.
  - The <u>methodology</u> was sound--but there was nothing new
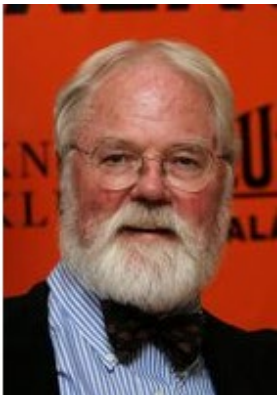
"Anything not worth doing is worth not doing well."

Robert Fulghum, *All I really need to know I learned in* Kindergarten

The Summary Statement

SUMMARY STATEMENT
(Privileged Communication)

PROGRAM CONTACT:
TONSE RAJU

Release Date:

Principal Investigator

Application Number:

Review Group: **ZRG1 EMNR-P (55)**
Center for Scientific Review Special Emphasis Panel
RFA Panel: Studies in Neonatal Resuscitation

Project Title:

SRG Action: Impact Score: 38   Percentile: 29 #
Next Steps: Visit http://grants.nih.gov/grants/next_steps.htm
Human Subjects: 10-No human subjects involved
Animal Subjects: 44-Vertebrate animals involved - SRG concerns

Project Year	Direct Costs Requested	Estimated Total Cost
1	243,847	370,647
2	263,144	399,979
3	250,128	380,194
4	261,773	397,895
5	287,084	436,368
TOTAL	1,305,976	1,985,083

ADMINISTRATIVE BUDGET NOTE: The budget shown is the requested budget and has not been adjusted to reflect any recommendations made by reviewers. If an award is planned, the costs will be calculated by Institute grants management staff based on the recommendations outlined below in the COMMITTEE BUDGET RECOMMENDATIONS section.

NEW INVESTIGATOR

Writing a good NIH Application

Abstract

- The life of your application!
- Try to "perk" reviewers' interests right away as they read the opening lines of the abstract

Common problems

- Long (often unnecessary) preambles: Examples:
  - "Retinopathy of prematurity is a disease of the retina in premature babies" an application to the Eye Institute!
  - Why not say… "we propose an intervention for ROP that will lead to complete regression…"
- Not saying what will be done and how, until the final lines
- Not mentioning the impact of your research: Example
  - "We will explore the functions of XYZ enzymes in BPD patients."

Importance of Opening Lines

- "Mother died today. Or maybe yesterday; I can't be sure." –*The Stranger* by Albert Camus
- "Many years later, as he faced the firing squad, Colonel Aureliano Buendía was to remember that distant afternoon when his father took him to discover ice." –*One Hundred Years of Solitude* by Gabriel García Márquez,
- "You better not never tell nobody but God. It'd kill your mammy." *The Color Purple* by Alice Walker
- "It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness… *A Tale of Two Cities,* Charles Dickens.
- "It was a bright cold day in April, and the clocks were striking thirteen." –*1984* by George Orwell
- "I was looking for a quiet place to die. Someone recommended Brooklyn…" –*The Brooklyn Follies* by Paul Auster
- "On a very cold and lonely Friday last November, my father disappeared from the Dictionary." –*The Word Exchange* by Alena Graedon
- "Call me Ishmael" *Moby Dick,* by Herman Melville
- "All this happened, more or less." *Slaughterhouse-Five* by Kurt Vonnegut

Other Common Issues

- Some Problems
  - Crowded text in the page, with long, long paragraphs
  - Unreadable diagrams, or tables with too many datapoints
  - Typos
  - Not following formatting rules: font size, linespacing etc.

- Some Solutions
  - Good idea to have your application read by 3 people
    - Your colleague who knows the science
    - Your colleague who does not know the science
    - An English major college student (lucky if you have one!)
  - Ask them how many sentences they had to read twice to understand…rewrite those.
  - Ask them to explain what your study is all about, and why should it be done?

- Reading an application ought to be a pleasurable for the reviewers

Review Criteria for Career Development (K) Grants

- Candidate

- Career development plan/career goals & objectives/plan to provide mentoring

- Research Plan

- Mentor(s), Co-Mentor(s), Consultant(s), Collaborator(s)

- Environment & Institutional Commitment to the Candidate

What you need to put in your Background Statement

- Describe **your** <u>commitment to an academic career</u>

- Present <u>evidence</u> of **your** ability to <u>collaborate</u>.

- Describe **your** <u>research efforts</u> up to this point in your career: publications, prior research interests and experience.

What you need to put in your Candidate Statement

➢ Make a compelling argument why <u>you</u> need a K award.

➢ <u>State (and document) how</u> you are appropriately trained and well suited to carry out the proposed work.

➢ <u>State how</u> the proposed research is appropriate to your level of experience and that of your collaborators and help you in securing anR01.

➢ <u>Be specific:</u> give concrete examples of areas where you need additional training to conduct the proposed research

   ➢ Example: " I am a clinically-trained neurologist but need to learn the methodology for doing anatomic architecture of the developing brain.

Candidate

Pitfalls to avoid

➢ Need for additional training is not well justified.

➢ The candidate **(you)** appears overqualified

➢ The candidate is underqualified without adequate explanation

➢ **Your** potential to achieve independence is not well demonstrated.

➢ Your path to independence is not explained.

➢ **Your** personal statement is not coordinated with other parts of the application.

➢ **Your** research record is not explained

Career Development Plan: Pitfalls to Avoid

Pitfalls to avoid

- Gaps in knowledge/skills not addressed or explained.
  - What exactly would you achieve by this K award?
  - Example: as a general neurologist, you may wish to learn about techniques in neuroanatomic studies

- The plan is not personalized and is too generic.

- The need for an award is not justified.

- Poor description of the career development plan.

- The plan is unrealistic (too ambitious) or inadequate (sketchy).

Letters of support

- Offer to draft the letter of support for your mentors, who may be very busy
- Letters of support should be <u>enthusiastic, should read genuine</u>
- Letters should be personalized explaining the roles of co-mentor, collaborator, consultant, advisor, oversight committee member, etc.
- Describe the frequency and contents of meeting and monitoring the applicant's progress, and the details of all the support items
- Form letters are not good
- Should not be too generic or lukewarm:
    - *We will support her with whatever she requires to do her research*
    - *We are looking forward to hiring him, should he get this K award*

Text from real Summary Statements

Good and Bad :K applications

National Institutes of Health
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K23: First Submission, Not Discussed

- **Reviewer 1**
  - Candidate 4
  - Research Plan: 4
  - Other criteria scored 1-3

- **Reviewer 2**
  - Career Development Plan 4
  - Other criteria, 1-3

- **Reviewer 3**
  - Candidate: 4
  - Career Development Plan 5
  - Research Plan: 5
  - Other two criteria, 2-3

In the Summary Statement, Page 2: "No clear career development and mentoring plan; limited peer-reviewed first author publications; the proposed research will have limited impact on developing the candidate's clinical research potential."

Another K23, Not Discussed (ND)

- No statistical plan for any of the study objectives

- Unclear if mentors reviewed this application

- Overambitious research plan

- "Not discussed" does not mean hopeless!
  - Resubmission success rates are much higher than first submission success rates!

- If you don't ask, you will never be funded!!

K99, Discussed, Priority Score 35; Not Funded

➢A limited enthusiasm of the review panel (despite…) institutional commitment to the candidate.

➢Candidate: "outstanding" "excellent to predominantly outstanding"

➢**The Mentor(s), Co-Mentor(s), Consultant(s), Collaborator(s):**

    ➢**The lack of primary mentors in more senior academic positions**
    ➢**Some of them with no mentoring experience**
    ➢**The team seems weak in the areas of study design and statistical analysis.**

K23: Priority Score 44

➢ The strength of the application lies in the excellent training environment

➢ A relatively strong Mentor(s), Co-Mentor(s), Consultant(s), and Collaborator(s)—"excellent to outstanding."

➢ **Less enthusiastic:**

  ➢ **The Career Development Plan. The scores were "good" (not outstanding)**

➢ **The Research Plan:**

  ➢ **"Satisfactory." "likely to have moderate impact" on the field**

➢ Overall, in the present form, this is a "good to very good" application

First submission K08--Funded

➢ *"Major strength of this application*:
   ➢ Mentor(s), Co-Mentor(s), Consultant(s), Collaborator(s) and Environment Commitment to the Candidate.

➢ Scored exceptional for the following criteria:

   ➢ *"The Candidate and the Career Development Plan: "highly appreciated"*
   ➢ *"The Research Plan: considered strong.*
      ➢ *But the reviewer's opinions were divided*

➢ Yet, all reviewers agreed that this was "…*an outstanding to exceptional K08 application…*"

After receiving your summary statement...

- If not discussed…, just yell, put aside the summary statement for a few days…
- Then, read it again
  - List both the positive and negative comments
  - Accept the reality—the reviewers may have valid points!
- Contact the PO; discuss appropriate ways to respond to the negative points.
- Discuss and receive advice from co-investigators, colleagues and seniors prior to rewriting
- Develop additional data, if possible

After receiving your summary statement...

- Be polite in the 2-page response in the revised submission

  - Start by thanking the reviewers for their "insightful" (and wise ☺) comments
  - Emphasize the good points (if any!) made by all the reviewers…
  - Describe your responses to the critique: state the page numbers where the changes are made, that have highlights.
  - Highlight judiciously: **boldfacing** or highlighting the **entire page** is not good

- How not to respond: Real-life examples:
  - *"Reviewer 2 says that a better technique for the assay was…. REALLY?!!"*
  - *"The primary reviewer that that the research would have low impact… perhaps he/she is has not read, or forgot the following, latest literature, many of them coming from our own laboratory…"*

Few Parting thoughts… NIH is Not an ATM

- NIH is a partner in science
- You did the studies using taxpayer $$s
- While speaking to the CNN on your "breakthrough" research, first thank the taxpayers of USA, and thank the NIH.
- This helps the public to learn something about NIH
- As soon as you know that a major paper from you has been accepted, please inform the PO before its publication
- Especially, a hot topic that might be covered by the media.
- Often, NIH will collaborate with your university to announce press releases, and would be ready to respond to calls from the media
- NIH Directors use the success stories during their annual meetings with the Congressional appropriation committees
- Share the stories of your successes with the PO:
  - Awards and promotions, nominations to national/international organizations
  - Your Nobel Prizes and/or Lasker awards ☺

Keep Trying, Never give up
Persevere…because

If you don't ask, you will never be funded….

Thank You…